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Humboldt Penguins (*Spheniscus humboldti*) in the Northern Hemisphere

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ABSTRACT.—Penguins, Southern Hemisphere birds, were introduced to the Northern Hemisphere several times in the 1930s. None of the four species introduced became established but some individuals survived for at least a decade. Humboldt Penguins (*Spheniscus humboldti*) were observed in waters off the west coast of North America several times in the 1970s and 1980s and one was caught in a fishing net in Alaska in 2002. Penguins theoretically might be able to swim to suitable habitat in the Northern Hemisphere, but we argue the most likely explanation for their arrival in the Pacific Northwest was by fishing boat. Received 21 October 2005. Accepted 3 September 2006.

On 18 July 2002, salmon fisherman Guy Demmert caught an adult Humboldt Penguin (*Spheniscus humboldti*) in his purse seine net off Noyes Island, Alaska (55° 30' N, 133° 40' W), nearly 10,000 km from its native range in Peru and Chile (from 5° S to 42° S). The penguin appeared healthy and robust, and was released unharmed after being photographed (Guy Demmert, pers. comm.) (Fig. 1). This may not have been the first sighting of penguins in Alaska. A 1976 research cruise in the Gulf of Alaska recorded “brown penguins” (M. J. Rauzon, pers. comm.), and Guy Demmert (pers. comm.) saw a penguin while fishing in 2001.

There are four earlier observations of Humboldt Penguins along the west coast of North America. In 1944, a single penguin was seen in the Queen Charlotte Islands (Beurling 1978); another was observed in 1975 near Long Beach, Washington (Campbell et al. 1990). There were three reports in 1978 of one to three Humboldt Penguins on northern Vancouver Island (Burnes 1978) with pictures of the penguins published in regional newspapers (Anonymous 1978b). One was seen in 1985 off the Washington coast (Campbell et al. 1990).

The only penguin species known to breed in the Northern Hemisphere is the Galapagos Penguin (*S. mendiculus*), with a few dozen

pairs just north of the equator on Isabella Island (Boersma 1977). All other penguin species are confined to the Southern Hemisphere. The absence of penguins in the Northern Hemisphere is generally attributed to a combination of history and climate; the ancestors of penguins evolved in the Southern Hemisphere, and thermal and productivity barriers prevented them from moving northward (Sparks and Soper 1987, Soper 2000). Penguins require cool productive water to survive (Williams 1995) and are limited to areas where water temperatures do not exceed 20° C (Sparks and Soper 1987, Soper 2000). Even the Galapagos Penguin is mainly restricted to productive cold water (Boersma 1978).

We compiled reports of penguins in the Northern Hemisphere, and addressed three possible mechanisms explaining the presence of Humboldt Penguins in the north Pacific: (1) naturally occurring vagrant, (2) escape from Northern Hemisphere zoos, and (3) intentional release into the wild.

Naturally Occurring Vagrant.—Reports of vagrant penguins (e.g., outside their normal range) are not uncommon within the Southern Hemisphere. Macaroni (*Eudyptes chrysolophus*), Rockhopper (*E. chrysocome*), and King (*Aptenodytes patagonicus*) penguins have rested on beaches at Punta Tombo, Argentina, hundreds of nautical miles from breeding colonies (PDB, pers. obs.). Juvenile King Penguins were seen molting near Palmer Station, Antarctica in January 2001 and 2002, more than 1,300 km from the nearest breeding colony (PDB, pers. obs.). In extreme examples, Yellow-eyed (*Megadyptes antipodes*) and Erect-crested (*E. sclateri*) penguins were seen in the Falkland Islands, more than 8,000 km (4,300 nautical miles) from their breeding areas in New Zealand (Harrison 1983, Strange 1992), and Little Penguins (*Eudyptula minor*) were observed in Chile, 10,000 km (5,400 nautical miles) from their native range (Valverde and Oyarzo 1999, Brito 2000, Wilson et al. 2000).

The distances traveled by these individuals

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FIG. 1. Humboldt Penguin caught by salmon fisherman Guy Demmert on 18 July 2002 near Noyes Island, Alaska (photograph by Darin Fordyce).

is comparable to a Humboldt Penguin swimming from Peru or Chile to Alaska (~10,000 km), but the marine environments each would need to traverse are different. A penguin could complete the journey from New Zealand to the Falkland Islands by exploiting the Antarctic Circumpolar Current with its ample prey resources and without experiencing water temperatures in excess of 10–15°C (Duxbury and Duxbury 1994, Christoph et al. 1998). In contrast, a Humboldt Penguin swimming to Alaska would need to cross 4,500 km of mostly unproductive water between 20 and 35°C without the aid of currents (Lalli and Parsons 1997).

Primary production in the eastern tropical equatorial and north Pacific averages 80 g C/m²/year (grams of carbon/meter² per year), much lower than the 350 g C/m²/year in the upwelling regions where Humboldt Penguins live and breed (Duxbury and Duxbury 1994). However, coastal productivity averages 150 g C/m²/year with areas along the west coast of the United States as high as 350 g C/m²/year (Duxbury and Duxbury 1994). Eddies, shelf breaks, river plumes, and tidal fronts may also

provide local concentrations of phytoplankton that can be exploited by zooplankton and their larger predators (Lalli and Parsons 1997). Thus, a Humboldt Penguin could potentially find sufficient food by remaining close to the eastern Pacific coast. However, a bird following this route should be conspicuous while resting on the beach—especially along the crowded coast of California—and no Humboldt Penguins have been reported to the California bird records committee (Philip Unitt, pers. comm.).

A Humboldt Penguin crossing through equatorial waters would also face a thermal barrier. Penguins thermoregulate in the cold waters of their native ranges by a combination of subcutaneous fat deposits and dense overlapping feathers that prevent water from reaching the skin surface. In warm weather, while on land, these same attributes can cause penguins to overheat and die (Boersma 1974a, Simeone et al. 2004). The upper limit of a Humboldt Penguin's thermoneutral zone is approximately 30°C (Drent and Stonehouse 1971) and, on land, Humboldt Penguins at rest

use evaporative heat loss via body positioning or panting to avoid heat stress in temperatures exceeding 25–30° C (Simeone et al. 2004). In crossing the equator, Humboldt Penguins would experience water and air temperatures in excess of 30° C, and active swimming would further increase the heat load by generating metabolic heat. A penguin in warm water would be restricted to panting to eliminate excess heat, which would prevent the bird from either foraging or transiting. Thus, while a Humboldt Penguin traveling from Peru or Chile to Alaska might be able to find food, it would probably not survive the high tropical temperatures.

Escape from Northern Hemisphere Zoos.—Penguins do escape from zoos: on 9 August 2002 a Magellanic Penguin (*S. magellanicus*) chick was reported missing from the Point Defiance Zoo in Tacoma (Anonymous 2002). It was thought to have escaped to Puget Sound and “fledged.” Whether it did or not is unknown, as it was not seen again and no corpse was found. An African Penguin (*S. demersus*) seen 3–16 February 1981 near Chimney Rock, Pt. Reyes, California, likely escaped from a California zoo (Pyle and McCaskie 1992). Notably, no penguins were reported as escaped prior to the repeated Humboldt Penguin sightings near Vancouver Island in 1978 (Burnes 1978).

Humboldt Penguins are kept in more zoos (approximately 150 worldwide) than any other penguin species (International Species Information System 2005). Over 2,000 Humboldt Penguins are kept in zoos and aquariums in Japan alone, more than in any other country (Boersma 1991). Zoos typically use permanent bands or tags to mark their penguins. None of the Humboldt Penguins observed in the north Pacific (including the one captured by fisherman Demmert) was marked, suggesting they were not zoo escapees. The possibility that Humboldt Penguins escaped unmarked and unreported cannot be excluded, but there is no independent evidence supporting introduction to the wild from captive zoo populations.

Intentional Release into the Wild.—Introductions of penguins into the Northern Hemisphere have occurred, but none established self-sustaining populations. In August 1936, Carl Schoyen of Norway’s Nature Protection Society

released nine King Penguins at Gjøsvær, West Finnmark, and Røst, Lofoten (Lund 1953, Curry-Lindahl 1963, Sparks and Soper 1987). Four of the birds were captured and killed within 1 year. On 31 May 1944, a single individual was seen alive at Breistrand, Vesterålen, almost 8 years after its release (Curry-Lindahl 1963). Gentoo (*Pygoscelis papua*) and Macaroni penguins were also introduced at Røst, Lofoten in 1938, but all were dead by the following year (Blædel 1963). Norway’s Nature Protection Society may have released several African Penguins, also in 1938 (Sparks and Soper 1987). The last penguin (species unknown) reported in Norway was seen on 2 July 1954, at Selsøyodden in Hamarøy (Sparks and Soper 1987).

There is indirect evidence that penguins may also be transported and released capriciously by fishermen and boaters. Live penguins are sometimes kept on shipboard by fishers (PDB, pers. obs.). In 1978, a Japanese trawler visiting Halifax, Nova Scotia had on board two King Penguins caught in nets when they were fishing in the Southern Ocean (Anonymous 1978a). Local fishermen in Peru capture and use Humboldt Penguins as bait (Patricia Majluf, pers. comm.). On 2 September 1961, a Rockhopper Penguin captured in a salmon net near Pukaviken, Blekinge, Sweden (Nilsson and Lundgren 1993) likely traveled from the Southern Ocean on a USSR fishing/whaling vessel returning to the fleet port at Kaliningrad (Magnus Forsberg, pers. comm.). The Humboldt Penguins seen off Washington and British Columbia were thought to have been brought from South America as fishermen’s pets (M. C. E. McNall, pers. comm.). A Galapagos Penguin found dead on the coast of Panama (Eisenmann 1956) was probably picked up in the Galapagos by a pleasure boater who released it upon arrival in Panama—this is a common route that boaters often follow (Boersma 1974b).

Could the Humboldt Penguin captured in Alaska have come by boat? In the mid- to late 1970s, tuna vessels fished along the west coast of the Americas from northern Chile to California (Inter-American Tropical Tuna Commission 1979, 1980). The Humboldt Penguins seen off Vancouver Island in 1978 could have traveled by tuna boat from Peru or Chile, being released before the boats docked in Seattle. Seiners con-

verting to Alaska crab boats in the late 1970s after the crash of the Peruvian anchovy fishery might also have brought Humboldt Penguins northward (M. A. Hall, pers. comm.). Boaters transporting penguins might have jettisoned the birds as they approached United States or Canadian ports for fear of prosecution under wildlife or health laws.

DISCUSSION

It seems unlikely that a Humboldt Penguin would swim nearly 90 degrees latitude (over 5,400 nautical miles) from Peru or Chile to Alaska. The lack of identification tags or reports of escapees suggests the penguins seen in Washington, British Columbia, and Alaska were not zoo birds. The most parsimonious explanation for a Humboldt Penguin reaching the Northern Hemisphere is that it got a lift on a boat. If the penguin captured by Demmert was brought by boat to Alaska, the question is when. *Spheniscus* penguins can live more than 25 years in the wild and as much as 36 years in zoos. It is possible the Humboldt Penguins that mysteriously appeared near Vancouver Island in 1978 were seen in Washington waters in 1985, and finally reached Alaska in 2002.

In the Northern Hemisphere, alcids are the ecological equivalent of penguins and, like penguins, are largely confined to areas of high productivity. The north Pacific has conditions suitable for penguin survival (Sparks and Soper 1987). As a temperate species, Humboldt Penguins would be physiologically well-adapted to conditions in the temperate north Pacific with its cold and productive waters similar to those in the upwelling region of the Humboldt Current off Peru and Chile. The Humboldt Penguin captured in Alaska may have been feeding on herring (*Clupea harengus pallasii*), a fish ecologically analogous to the anchovies it would find in its native waters. Temperate penguins (Humboldt, African, Magellanic) persist well in open-air Northern Hemisphere zoos where they are protected from predators and provided food. Their breeding and molt seasons become shifted within approximately 1 year and they follow their typical seasonal schedule (e.g., breeding in the northern spring). Scotland's Edinburgh Zoo has been successfully breeding sub-Ant-

arctic penguins in outdoor pens since 1919 (Sparks and Soper 1987).

Penguins can survive in the wild in the Northern Hemisphere, but whether they can establish themselves remains an academic question. Of the penguins released in Norway, one pair (probably Kings) was reported brooding an egg at Sandholmen in 1944. One penguin was later killed by a fisherman and thought on inspection (and consumption) to be a young bird (Lund 1953). In 1948, a penguin fledgling (species unknown) was supposedly found, adopted, and cared for by a Sund, Lofoten man (Lund 1953).

Introductions are likely to continue as people move species around the globe, but it seems improbable that penguins will become established in the Northern Hemisphere for two reasons. First, so few are introduced and penguins breed more successfully in large groups (Boersma 1991). Second, the Northern Hemisphere has mammalian predators like bears (*Ursus* spp.), which the Southern Hemisphere lacks in coastal regions (the Spectacled Bear, *Tremarctos ornatus*, is mostly restricted to the Andes; Servehen et al. 1999). Predation is a concern for introduced penguins, as one of the Humboldt Penguins seen in British Columbia was captured and eaten by an eagle (Beurling 1978). Problems associated with small population size and predators will likely prevent any penguin species from colonizing the Northern Hemisphere, despite the fact they can survive for many years in the productive waters of the temperate north.

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